



PUTTING RESEARCH TO WORK

# BRIEF

## Better Mussel Surveys Reduce Bridge Construction Costs

Mussels are an important component of freshwater ecosystems, including rivers, streams and lakes. Freshwater mussels feed on fine particles of algae, bacteria and detritus suspended in the water, which helps keep these bodies of water clean. Unfortunately, mussels are susceptible to disturbances caused by dams, pollution, construction activities, and the introduction of non-native species, and are experiencing a decline in population. In Wisconsin, 56% of native freshwater mussel species (28 of 50) are listed as endangered, threatened, of special concern, or extirpated.

Highway construction activities, especially bridge projects, can disturb the habitat of mussels and other aquatic life. To preserve these creatures and comply with state and federal regulations, WisDOT surveys streams for mussels before construction begins, relocating listed mussel species as necessary.

### What's the Problem?

The Wisconsin Environmental Policy Act requires the state Department of Natural Resources to assess the impacts of proposed transportation projects to ensure that construction activities will not jeopardize the survival of endangered or threatened species, including mussels. Because of the lack of comprehensive statewide mussel population data, most bridge construction projects require a costly and time-consuming underwater study.

In addition, methods of collecting mussels and mussel habitat information have in the past been left to the discretion of individual biologists. Each contractor that performed mussel surveys and relocation for WisDOT had to develop collection procedures before beginning work, which increased the time and money required for the project.

### Research Objectives

Researchers had four goals:

- Consolidate published and unpublished information on the geographic distribution and relative abundance of native mussels.
- Identify geographic areas and bodies of water that have not been adequately surveyed for mussels.
- Develop sampling protocols for use in a statewide mussel inventory of wadable streams.
- Collect mussel distribution information for bodies of water associated with proposed transportation projects.

### Methodology

Researchers used WDNR's database and published literature as the basis for developing a Wisconsin Mussel Atlas. They combined this data with data in unpublished literature, creating an electronic database linked to a GIS-based map. To develop the sampling protocols, researchers reviewed existing literature and drew on their own research and experience.

### Results

The completed mussel atlas identifies the locations of past mussel surveys, and includes data such as the date of the survey, species collected, and number of live mussels and empty shells found.

With input from mussel experts around the state, researchers identified 15 bodies of water as priorities for future sampling efforts based on the lack of current information on their mussel populations.

Researchers established sampling protocols for wadable streams designed to determine whether mussels are present, which species are present, and the density of the mussels in their habitat. Details of the procedures include:

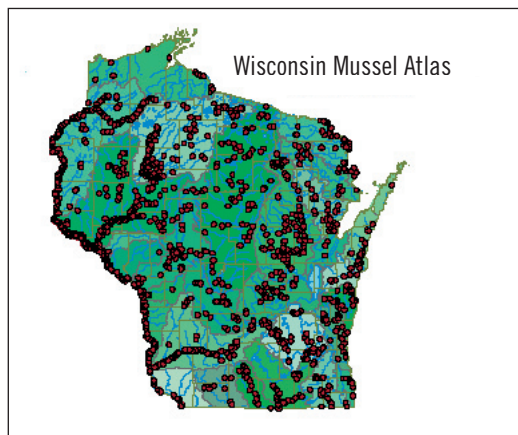
#### Investigator



*"This standardized protocol will allow us to document mussel distribution and abundance, which will ultimately help our freshwater mussel species."*

— Randal Piette

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Standardizing sampling procedures will allow researchers across the state to compare data on mussels like this buckhorn. At right, red dots on the Wisconsin Mussel Atlas indicate sites of previous mussel surveys.

- 1. Assessing presence of mussels.** An initial survey using rapid qualitative sampling (timed searching) should be used to determine whether mussels (live or dead) are present. This initial search also establishes general water quality and mean stream width. Search time should be limited to one hour.
- 2. Identifying mussel species.** A second, more intensive qualitative search should be used to establish a list of mussel species at the site. If possible, two people should conduct the search using masks and snorkels. The search should continue for a minimum of two hours or a maximum distance of 200 meters for smaller streams (less than 15 meters wide) and four hours or 300 meters for larger streams.
- 3. Comparing mussel populations and assessing changes.** Quantitative sampling should be used to determine mussel population density, age structure and habitat data, and to assess the change over time in mussel populations. Samples should be taken from randomly chosen squares within a grid; before-and-after surveys should be taken to determine construction's effect on mussel populations.

**Relocation.** Mussel surveys should cover the entire area of bridge construction, including the location of the new bridge and any temporary structures used to construct it. If mussels are discovered, they should be relocated from all areas of impact to safe habitat nearby. Relocation should occur immediately before construction begins to ensure that mussels do not reestablish habitation at the site before work starts. A monitoring program should be initiated to evaluate the success of the relocation.

## Implementation and Benefits

The mussel atlas allows project managers to quickly locate sites that have previously been inventoried, which may mean a new survey is not required before bridge construction. Eliminating a mussel survey can save considerable preconstruction time, as well as money—a large underwater survey typically costs between \$50,000 and \$100,000.

The mussel sampling procedures developed in this project will standardize the collection of mussel data, facilitating statewide comparisons of mussel communities and mussel habitat. The quantitative sampling procedures will reduce collector bias and sampling error. The new protocols will be used in WisDOT mussel surveys beginning in 2005.

## Further Research

By consolidating all available population data, researchers laid the groundwork for a comprehensive statewide mussel inventory. Both WDNR and WisDOT will add data to the atlas as resources allow.

In the future, standardized sampling protocols should be developed for nonwadable waters.

*This brief summarizes Project 0092-01-09, "Fresh Water Mussel Study," produced through the Wisconsin Department of Transportation Research, Development & Technology Transfer Program, 4802 Sheboygan Ave., Madison, WI 53707.*

*Nina McLawhorn, Research Administrator*

### Project Manager



*"The Wisconsin Mussel Atlas is an additional resource that will save time in locating previous survey sites. And when we can eliminate the need for a new survey at a site, we save money, too."*

— Gary Birch

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